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EXECUTIVE SUMMARY

Introduction

The Arizona Department of Transportation (ADOT), Aeronautics Division has prepared the Navigational Aids and Aviation Services Special Study to provide guidance in the development of the Arizona Primary and Secondary system of 95 airports with regard to instrument approaches, visual landing aids, communications, weather and aviation services. A project advisory committee representing pilot, airport management and aviation system users participated in the development of the Study findings, priorities and recommendations. Pilot information meetings were also conducted in Flagstaff, Phoenix and Tucson to present preliminary findings and obtain user input.

Study Basis

A primary objective of the Study is to identify improvements to the Arizona system of airports that have technical, practical and financial merit. This is accomplished by balancing facility improvements with the system's ability to accommodate them in an economically viable fashion. Use of operational and performance evaluation criteria and benefit/cost analyses, tempered with consideration of system objectives, allows for such assessments. For example, to address the need for improved instrument approach capability, application of global positioning system (GPS) technology is emphasized. GPS, in most instances, does not require the installation of ground facilities. However, the airport's physical layout with respect to compliance with applicable design standards may limit its ability to achieve a new or improved instrument approach in terms of lower minimums. The cost to meet standards versus the safety and operational benefits associated with the potential instrument approach minimums may not balance and thus suggest that the approach procedure is not economically justified. This same reasoning may apply to the installation of an approach lighting system to reduce the visibility minimum. The question to be addressed in this situation is whether the cost to install, operate and maintain the approach lighting system (its life cycle cost) is more or less than the incremental safety and operational benefits.

Application of this planning rationale was made to the other components of the Study such as the communications and aviation weather facilities. Visual landing aid improvements were based on establishing a standard level of service to pilots irrespective of airport activity levels.

Aviation service needs were determined primarily from the results of a random survey of pilots and airport managers/operators as well as input from public information meetings conducted during the Study. It was recognized that some of the needs identified by the "users" could not be provided or obtained through ADOT Aeronautics resources. Nevertheless, these needs were listed in the Study.

The Study provides an overview of existing capabilities, deficiencies and recommended improvements to be implemented over a 10-year period. Although economics has played a significant role in determining facility needs and the priorities for staging these improvements, operational factors such as system gaps, remoteness and emergency services may be more important under certain conditions. This situation is more pronounced in the northeast quadrant of Arizona (northern portions of Apache and Navajo counties). Some of the needs in this region of the State have been accommodated to meet system objectives with regard to low approach minimum capabilities and weather movement coverage. However, consideration of other operational factors may be appropriate when formulating the ADOT Aeronautics Five-Year Airport Development Program.

Guidelines/Criteria

The Planning Advisory Committee for the Study established the following criteria to be used in evaluating terminal navigational aid (NAVAID) facilities in Arizona:

1. A need for an adequate number of practice instrument approach facilities.

2. Access to emergency medical facilities and capability for night and/or adverse weather condition operations at airports in Arizona.

3. The use of Federal Aviation Administration Terminal Instrument Approach Procedures (TERPS) and airport design guidelines to determine the ability of airports to meet global positioning system (GPS) criteria.

4. All commercial service and reliever airports should be evaluated for the potential to provide a GPS precision instrument approach capability (Category I – 200-foot ceiling and ½-mile visibility).

5. All other paved runway, public-use airports in the State should be reviewed for the potential to provide GPS nonprecision instrument approaches (minimums of 300-foot ceiling and ¾-mile visibility or 400-foot ceiling and 1 mile visibility). All active Native American airports were to be included in the Study.

6. Visual landing guidance facilities will be planned for the primary end of the primary runway at each airport in Arizona.

Findings

Principal findings with respect to the key components of the Study are presented below.

GPS Approaches

Thirty-one (31) of the 95 system airports have an instrument approach procedure and, of these, 10 meet the evaluation criterion expressed as a desired or target level of capability in terms of approach minimums. Eleven (11) of the remaining 21 airports can achieve their target levels by development and publication of a new procedure as suggested in the Study. Of the final 10 airports in this category, 6 airports cannot qualify for an improved or new procedure due to an unacceptable cost/benefit ratio. Of the remaining four (4) airports, insufficient information was available concerning compliance with FAA design standards to make an objective determination concerning the GPS approach capability.

Many airports (64) do not have an existing instrument approach procedure. Evaluation of these airports indicated that 25 could expect to support an instrument approach capability consistent with their assigned minimums category. Also in this group were five (5) airports that could not qualify for an instrument procedure due to an unacceptable cost/benefit ratio. At another five (5) airports, it was determined that an instrument approach procedure was not possible due to an inability to obtain TERPS criteria. Information concerning compliance with FAA design standards was not available for 29 airports identified in this group and additional data will be necessary to justify an instrument approach procedure.

Visual Landing Aids

Visual landing aid facilities were required for the primary end of the primary runway at each airport to provide a consistent service level at airports in Arizona. A total of 44 airports meet these criteria at the present time while these facilities need to be installed at 51 airports in the system.

Communications

The ability of pilots to conveniently and efficiently communicate with air traffic control facilities immediately before and after flight is a valuable service for the more active airports. The Study revealed that 11 airports within the system should be provided with this capability. After installation of these facilities, the total number of airports in Arizona with this capability will increase from 35 to 46 airports.

Weather

Automated weather observing system (AWOS) and automated surface observing system (ASOS) units are operational at 25 airports in Arizona. Application of a series of evaluation criteria including cost/benefit analyses demonstrated a need for an additional 41 units (28 AWOS-3 and 13 AWOS-A).

The establishment of a weather network to acquire and disseminate aviation weather data on a real-time basis to pilots, airports, federal and state agencies, and other interest groups, including the general public is possible. The network can be established using existing and planned State telecommunications systems and the use of personal computers at airports. The network may be implemented under a public or a public/private partnership arrangement.

Aviation Services

The Study revealed that most pilots are satisfied that the essential services required at airports are available to them. Both pilots and airport operators/managers, however, see a need for more hangars, covered tiedowns, wash racks, rental/courtesy cars, restaurants/food service and flight planning rooms. High on the list of unmet needs was an Arizona aeronautical chart (previously published in 1992-93 but discontinued), expansion of aviation seminars and access to airport/aviation data and/or publications.

Implementation

The criteria for staging NAVAID facilities throughout the 10-year planning period was based upon scheduling those airports capable of realizing the most operational benefit in the least amount of time for the initial investment dollars. The number of airports and the dollars invested in the NAVAID facilities is illustrated below:

	Number of Airports				
	GPS	MALSR/ SSALS	AWOS	VISAIDS	GCO
Stage I (1-4 years)	25	1	23	19	11
Stage II (5-7 years)	13	8	6	19	0
Stage III (8-10 years)	30	3	12	18	0

	Capital Investment ($ x 1,000)				
	GPS	MALSR/ SSALS	AWOS	VISAIDS	GCO
Stage I (1-4 years)	0	150	1,140	821	132
Stage II (5-7 years)	0	2,000	385	821	0
Stage III (8-10 years)	0	750	2,305	821	0
Total	0	2,900	3,830	2,463	132

Note: If Category I ILS (or TLS) equipment is installed at four (4) airports that are qualified for the equipment, Stage I costs will increase by an additional $2,000,000.

System capital costs during the 10-year period could amount to approximately $11.5 million in 1998 dollars. Of that amount, federal funding could account for as much as $8.3 million but more likely those costs would be absorbed by the State. Operating costs would add an additional $728,000 to annual system costs (which includes approximately $451,000 in annual replacement costs).

Recommendations

The objective of the Study was to provide a comprehensive review of the existing navigational aids, aviation weather collection and dissemination systems and the aviation services provided to pilots and other users of aviation in the State. The NAVAIDS Study examined the existing terminal navigational facilities in the State, evaluated the capability of all public and Native American airports to support improved or new NAVAID facilities and quantified the costs associated with upgrading and improving the existing system during the next 10 years. Following the recommendations in this Study, the aviation system in the State of Arizona will be safer, more efficient and improve aviation service to pilots and other users of the system. The basic NAVAID facilities and aviation services recommendations made in the Study are:

1. Coordinate the design of GPS instrument approaches, both precision and nonprecision, with the FAA Western-Pacific Region. Follow the priority of GPS approach establishment determined in the Study for the most cost effective and operational benefit.

2. Procure and install visual landing aids required at system airports to improve service and safety throughout the system.

3. Equip eligible airports with ground communication outlets (GCO). The most efficient and economical method to install GCO equipment would be purchase the entire package and distribute the equipment to eligible airports through use agreements. Use agreements should provide for removal of the GCO in the event that the sponsor could not fulfill its operating obligation.

4. Equip airports with automated weather observing system (AWOS) utilizing a package procurement system similar to that recommended for GCO's. Use agreements should include FAA operating and maintenance procedures for standardization throughout the State aviation system.

5. Evaluate the necessity of reallocating priority for NAVAID installation in those areas of the State where there are deficient aviation services and facilities (Northeast and Southeast Arizona). Emergency service availability should be a major factor in determining priority.

6. Coordinate with the State agencies/divisions to design a weather network to serve multiple users and needs. Priority should be given to the northern half of the State. Examine the possibility of a public/private partnership to operate and maintain the network.

7. Periodically survey pilots, airports and fixed base operators to assess aviation needs and services. Produce the Arizona Aeronautical chart on a regular basis. Increase communication with the State's pilots and airport operators through newsletters, seminars and the Internet. Include the FAA in the communication/education process.

8. Analyze those airports/facilities for which insufficient information was available to determine their capacity to support NAVAID facilities and services. Determine their ability to comply with FAA airport design criteria and TERPS. Once determined, modify the results of this Study to include additional requirements in the NAVAIDS staging and prioritization schedules/programs.

Summary

The NAVAIDS and Aviation Services Special Study met the objectives of the Aeronautics Division in defining the adequacies of the State's existing navigational aids and aviation services. The Study analyzed the deficiencies and outlined a plan to reduce or eliminate the deficiency, improve the service to pilots and other users and provide facilities in remote areas to facilitate better access to emergency services. The Study will provide a basis for future development of the State's aviation system by improving aviation services throughout, increasing access to weather information for pilots and other users and increasing safety and security of flying within our borders. In addition, there is a potential to produce an intra-State weather network that could fulfill the needs of other State agencies and divisions.

The Study also assessed the costs to the State, the airport and the user. Three cost scenarios were studied to provide the State with funding requirements that might take place under a certain set of circumstances. At the time of the Study, the Aeronautics Division had lost a significant portion of its former aviation revenue. The FAA was seriously considering the reduction in procurement of additional NAVAID facilities for airports, a reduction in the number of FAA-maintained navigational aids and other programs, which would have a serious financial impact on major portions of this Study.

The major tenets of the Study remain intact. Prioritization of facilities were based primarily on economic factors (cost/benefit ratio) but provisions were made to recognize significant deficiencies in NAVAID coverage or availability of emergency services in specific instances. There is flexibility within the program and schedules to allow for adjustment in priorities should that be necessary. In conclusion, the Study has provided the State with a sound basis for improving NAVAIDS and services in the next 10 years as well as a foundation to conduct additional studies in the future. The Study is consistent with the goals and objectives of the Aeronautics Division and should serve the Division well throughout the planning period.